The American Biology Teacher

A PRACTICAL SERVICE AND IDEAS PUBLICATION FOR TEACHING AND LITERACY IN THE LIFE SCIENCES FROM THE ELEMENTARY GRADES THROUGH COLLEGE

Official journal of

The National Association of Biology Teachers

FEBRUARY, 1954 VOL. 16, NO. 2

THE AMERICAN BIOLOGY TEACHER

Publication of the National Association of Biology Teachers.

Issued monthly during the school year from October to May. Entered as second class matter October 26, 1939, at the post office at Lancaster, Pa., under the Act of March 3, 1879.

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Subscriptions, renewals, and notices of change of address should be sent to the Secretary-Treasurer, John P. Harrold, 110 E. Hines Ave., Midland, Mich. Correspondence concerning advertising should be sent to the Managing Editor.

Annual membership, including subscription, $3.75, outside United States, $4.50.

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COVER PHOTO

This interesting closeup of an American Marmot (*Marmota monax*) in Yellowstone Park was taken by genial Past-Pres. Harvey Stork. The American Marmot is a burrowing rodent about 18″ long, heavily-built, having coarse reddish and grayish fur, and is perhaps better known to most of us as a Woodchuck or Ground Hog. The Indians called them "Wejacks," from which our name Woodchuck has been adapted. Ground Hogs usually hibernate over winter, but may appear occasionally at the mouths of their burrows on warmer days and may "see their shadows" as this cover photo for the month of Ground Hog Day appropriately shows.

The contents of previous issues of *The American Biology Teacher* can be found by consulting the *Education Index* in your library.

New York University's **Dr. John Tebbel** says, "Magazine editors should realize that the American people are learning to read better all the time. Comprehension is rising. By 1960 to 1965, 40% of the people should be able to read material now published in *Harpers!*" Are life science teachers included, Dr. Tebbel?

Teaching Approaches to Conservation

LORENZO LISONBEE, Instructor of Biology, Phoenix Camelback High School, Phoenix, Arizona

Conservation is becoming a way of life. In America people of all ages are beginning to turn to the ideals and practices of a body of concepts now known as *conservation* and *resource-use*. A prophet is not needed to foresee that failing to turn to this way of life—so congruent to the Golden Rule—could mean extinction of our civilization in a few generations. This way of life means that man will use the earth's resources wisely in regard to self, to others, and to future generations, and will leave his earthly scene of action at least as good as he found it and, if possible, a little better.

CONSERVATION A NATURAL FOR BIOLOGY

Since a major part of the conservation field pertains to the great living resources of the earth and to ecological factors influencing their welfare, conservation education is a "natural" for biology. The close relationship between soil, plant cover, rainfall, ground water, and animal life reveals concepts so important to our economic well-being that citizens should be informed and have an understanding of them. For this reason, conservation studies in high school biology can be justified and should be made important. The subject matter content of conservation includes, among other things, problems of plant and animal wildlife, vocational opportunities, and startling statistics. It can be of keen interest to high school students.

BASES FOR SUCCESSFUL CONSERVATION TEACHING

To have a vital program of conservation education the biology teacher must, first of all, have a vision of this way of life, understand its precepts, and know its great concepts. Second, the teacher must have a desire to find ways and means to direct the conservation education program so that the teaching-learning situation is productive of interest and discovery by teacher and pupil.

Teachers who say they do not have time for a unit on conservation may be unaware of the great teaching-learning possibilities in this field. They should seriously examine and reconsider the subject matter content of the course they are teaching to determine whether or not the great concepts of conservation are more vital, more interesting, more important, and more far-reaching in the lives of their pupils than many things now being taught.

Assoc. Editor Klinge's Note: Mr. Lisonbee points up the variety of ways in which the conservation concept can be brought into biology teaching. This is a contribution of the NABT Conservation Project. Reprints of it will be available from the Project Leader, Dr. Richard L. Weaver, P.O. Box 2073, Ann Arbor, Michigan.

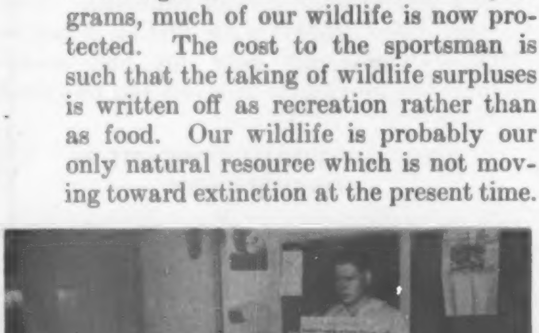
Leading science educators say, for example, that time devoted to experiences in conservation is likely to be much more valuable than time spent in dissecting the earthworm and frog. They say that teachers should dare to leave the embalmed biology of yester-year to their predecessors, and try the functional biology many science educators are finding easier to teach, more interesting, and more important. Conservation *is* important. It is functional. It has interest potentials. Every new biology text gives it greater emphasis. Year by year, more educators are finding it can be fitted with ease, not only into high school biology, but into all grade levels and into most subjects.

SOME IMPORTANT CONCEPTS IN CONSERVATION

To do a good job, teachers must have an overall picture of what they are teaching. From such concepts the teacher builds a philosophy and plan of action so that students are guided to these concepts in a manner that will stimulate interest, promote learning, and develop desirable attitudes and behavior. Here are a few of the basic ideas upon which biology teachers may build a vital conservation program:

1. There are invaluable materials in, on, and above the earth which man did not have to create or produce. These materials are soil, water, fish and wildlife, forests, grass, minerals, and the human population.

2. Man's economic, social, and political welfare is partially dependent upon the manner and extent to which he uses this natural wealth.
3. These natural resources are not limitless, and they are expendable. Some, like our minerals, can never be replaced. Others, like our soils, can be repaired if not too extensively damaged and still others, like our forests and wildlife, can replace themselves.
4. Most of us fail to see the direction we are moving in resource-use. We should realize that things have not always been as they are now. To many youngsters, for example, television has been here forever. To oldsters, certain gutted lands, barren hills, and the absence of wildlife have always been that way. An important concept to establish is that things have not been always as we now see them.
5. In nearly every case, we are moving toward depletion of our natural resources: for every three trees that disappear from the forest, only two are replacing them; an average of nine inches of top soil across our land has now been reduced to six; water tables are dropping alarmingly fast; many species of our wildlife have become extinct. Through state and federal game and fish conservation programs, much of our wildlife is now protected. The cost to the sportsman is such that the taking of wildlife surpluses is written off as recreation rather than as food. Our wildlife is probably our only natural resource which is not moving toward extinction at the present time.



Tom McCowan tells of personal experiences in the 1951 Kansas City flood, enlivening the conservation unit.

6. There is a close relationship between soil, surface and ground water, plant cover, and animal life including man. This points up the importance of the ecological aspects of conservation. Barren soil lacks the absorbing layer provided by plant cover. Precipitation, instead of being held and permitted to soak into the ground, runs off and culminates, in too many cases, in devastating floods. Flood water is water that should have soaked into the ground to recharge underground reservoirs and to supply needs of plants. Continuous, heavy runoff consequently drops the water table, drying springs and eroding lands. Proper plant cover tends to prevent floods, builds up ground water supplies, and provides food for livestock and man. Wildlife demands clear streams, plant cover, and wooded areas. Man, for the general welfare, must manage soil and plant cover in such a way that soil will be saved and made productive, plant cover maintained, and wildlife of many kinds encouraged to inhabit our watersheds.

7. The world's population is rapidly increasing, creating a greater demand on natural resources. Heavy population may bring a low standard of living by over-use and misuse of resources. However, there is strong argument that enterprising populations, even though densely peopled, can maintain a high standard of living through technological advancement, making re-use, new-use, and wiser-use of the resources. In simple terms, this implies that the low standard of living found in dense populations may not be due to over-population but to the lack of free enterprise on the part of *every* individual to study, invent, manufacture, sell, and travel. Where these opportunities are restricted, even in countries of sparse population, the standard of living is found to be low, resources are not developed, and substitutes are not found for depleted materials. If technological advancement progresses as population increases, the standard of living can be maintained or even raised, with new and useful products providing employment for hundreds of thousands of people.

8. Man is becoming alert to the problems arising from resource-use. A number of local, state and national agencies have become established to control and manage the use of natural resources, and to educate the citizenry.

TECHNIQUES IN TEACHING CONSERVATION; CASE STUDIES

The techniques generally recommended for teaching can be highly effective in teaching conservation. The teacher arranges situations in which students become alerted and discover the great concepts for themselves. The teacher exploits the interests, abilities, experiences, possessions, needs, and concerns of his students in guiding a spirited program. He uses various devices to arouse and maintain interest, moving with the student into fields of new exploration and discovery. The teacher exploits the *local* scene, around which the major portion of the unit is built. He has a watchful eye for the happenings of the day, for the coincidentalness of events with classroom studies is amazing.

It would be impossible to completely describe the activities and procedures that could be involved in an effective program in high school biology.* An attempt will be made here to relate a few case histories that seemed to have been efficacious in a program of conservation education.

Case 1. After introducing the general topic of the relationship between plant cover and flooding, Tom MacCowan came to the teacher after class; he was in the Kansas City flood of 1951, and had a stack of Kansas newspapers containing a complete record of the flood. His account of shoveling mud from business establishments after the flood receded led to leading questions about the source of the mud. Tom's presentation led to further class discussion of the cause and prevention of floods, specific health, economic and social problems resulting from floods, and the pros and cons of the TVA program.

Case 2. Tom Whipple collected ladybird beetles by the barrel during the preceding summer for his neighbor, George Quick, a nationally known distributor of ladybird beetles. Tom explained his work, how the ladybird beetles are packed, stored, and shipped, and how the farmer uses them in combating harmful insects. He used large 8" x 10" photographs to illustrate his talk.

Tom Whipple collected ladybird beetles by the barrels last summer for a distributor. Here he shows photographs during a report of his experiences.

Case 3. Alice Soule presented a series of color slides on the identification, control, and venomous nature of the scorpion. Treatment of the scorpion sting was also illustrated. Alice's father took the photos for the Poisonous Animals Research Laboratory at Arizona State College, and made them available to Alice.

Case 4. The outstanding art ability of Carla Phelps was discovered early in the year in one of the writer's classes. During the study of Arizona fish and game (see Case 10), the instructor and she saw the usefulness of a series of large, colored poster displays of Arizona fish and game.

Case 5. In developing the population increase–resource decrease concept, this question arose: "Don't wars, disease, and accidents keep the population down?" The class showed keen interest in population trends and controls. The resulting reports were startling when it was discovered, for example, that the birth surge during wartime may more than offset deaths due to war.

Case 6. In considering the loss of topsoil in our country, the question arose, "How much topsoil do we have here?" This led to investigations and experiments. Cheryl

* Over 50 suggested activities are concisely listed in the 4-page "Criteria for Conservation Teaching in Biology," now being used by the National Association of Biology Teachers for the Conservation Project, "to help increase the effectiveness of conservation and resource-use teaching by biology teachers." The writer strongly suggests that biology teachers not acquainted with this program and publication write to Dr. Richard L. Weaver, P.O. Box 2073, Ann Arbor, Michigan, and request a copy of the "Criteria."

Thieben and associates measured the topsoil in various places in the agricultural areas of the Salt River Valley. Interest in this investigation led to experiments on comparative growth of corn and bean seedlings in sand, subsoil, and topsoil.

Case 7. One pupil asked, "We don't have erosion around here, do we?" Another quickly retorted, "Yes, we do!" To prove his point, and to satisfy a number of others in the class, this pupil took photographs of places where irrigation run-off from a field and the trampling feet of cattle had cut tons of dirt away from the banks of one of the larger irrigation laterals, extending the width of the ditch at this point from 6 to 25 feet.

Case 8. LIFE magazine published a special issue on *The American and His Economy.* It treated a variety of topics that tied in with conservation problems. These magazine articles, in the light of a pessimistic viewpoint offered by the diminishing resource concept, brought a ray of hope and optimism to our classes. It helped to clinch important concepts in the thinking of many students.

Case 9. A convention of conservationists was held in Phoenix. Newspapers had leading articles reporting the problems discussed at the meeting. These reports were used to good advantage in class.

Case 10. The Salt River Valley Water Users Association had a great deal to say about storage water in the reservoirs, watershed conditions, and run-off. From these reports, interest led from one thing to another, culminating in an extended field trip (see Case 14).

Case 11. The state legislature was in session, and one of the great issues was who should control the use of ground water—the land-owner or the public? Again, real issues were at stake, and important concepts were learned from a consideration of the local problem.

Case 12. A campus field trip is always relaxing, and adds variation to the general routine of classroom activities. Identification, care, propagation, suitability for the climate, growth, and functions of the plants observed were considered.

Case 13. Deer season in Arizona opens in October. The two or three weeks preceding proved an opportune time to consider wildlife conservation. Many students went hunting; most of them were interested in wildlife. Materials collected over the years from various agencies were considered. A talented student prepared a series of large colored display posters of wildlife for identification purposes. Students who had hunted were encouraged to make reports. Issues of the Wildlife Bulletin of the Arizona Game and Fish Commission were available in the classroom, and many interested students had their names placed on its mailing list. A number of Forest Service films were profitably used. A survey made at the conclusion of the course indicated that this part of our conservation unit was one of the most interesting topics of study during the entire year.

Case 14. One of the big events of the year was an extended one-day field trip. The anticipation and preparation for a field trip of this kind stimulates interest in local conservation problems. Every school is within reach of an area that has many things to teach in resource use. To help other teachers to see how it was done in one case, the writer is taking the liberty of relating the step by step procedure of planning and executing a field trip that was a rich experience for the students, increased the prestige of high school biology in the state, and was a good public relations program for the school.

Phoenix lies in an irrigated agricultural area of 250,000 acres. Water is supplied from rivers, reservoirs and diversion dams having a total holding capacity of 2,500,000 acre feet of water. The watershed supplying these reservoirs covers a rugged mountainous area of 17,000 square miles, and lies in the Tonto National Forest.

In considering these facts some interest was shown in a field trip over the 220 mile Apache Trail Loop which reaches three of the main reservoir lakes, the famous Tonto National Monument Indian ruin, and very rugged, picturesque country. The teacher felt that the tour with Water User and Forest Service officials serving as guide-lecturers would be a very worth-while project. Planning proceeded as follows:

Step 1. *Determining student interest.*

Sampling a few classes indicated keen interest in the project. There were 600 students in the department. It was decided that at the most there should not be more than 100 taking the tour, considering the lecturing limitations in open country.

Step 2. *Determining the availability of resource officials to act as guide-lecturers.*

Step 3. *Determining transportation facilities.* Private cars would not be desirable in a group this size. The school did not own buses. Commercial bus companies were contacted.

Step 4. *Obtaining school approval.* We explained the plans and purposes of the tour to the principal and superintendent in a special conference. They were impressed, and approved the tour as planned. The field trip was to take place on Friday to accommodate students who had Saturday employment, and the Forest Service officials. The cost of the tour to the school was negligible. A \$3.50 fee from each student participating paid the transportation costs and, by doubling the classes in the department for a film day, it was not necessary to hire substitute teachers.

Step 5. *Planning the details with the resource guide-lecturers.* Ben Nelson, Jake West, and myself met in Mr. Nelson's office after school one day to plan the itinerary of the tour in detail. Stops were planned to give opportunity for observing and explaining water use and soil conservation in the irrigated areas, range management problems relating to land use and erosion of the watersheds, experimental projects (that accumulated facts concerning the relationship between grass, cattle, rainfall, run-off and erosion), use of reservoirs in storing and conserving water, and general watershed problems. In addition to this it was decided that the history of the Roosevelt Reclamation Project and the Forest Service in the area should be covered during the day. The time of departure and approximate time of returning was set.

Jake West relates some historical aspects of the irrigation project. (*left to right*) A. B. Clark (a biology teacher); Jake West; Mrs. Ben Nelson; author Lorenzo Lisonbee.

Step 6. *Planning details with students.* A complete sheet of instructions and procedures was prepared and mimeographed for students who desired to go. Formal announcement was made in each class.

Step 7. *Arranging other details.* It seems that multitudinous details spring up to be taken care of. *The success of a project of this kind depends upon the many small details foreseen and attended to.* Final arrangements were made with the bus company; the small store at Roosevelt Lake, where we planned to lunch, was notified in advance that we were coming so sufficient "pop" and extra help would be on hand; arrangements had been made with the supervisor at Tonto National Monument; a photographer and a reporter for the school and Phoenix newspapers had been invited; a passenger roster for each bus was prepared; etc.

The events of the day went according to plan. Students were apparently conditioned and readied for the day, for we had no disciplinary problems, and all seemed to see the significance of the various phases of the trip. Student reports and evaluation during the following week revealed that they had learned their lessons well during the day of the tour.

EVALUATING THE OUTCOMES OF CONSERVATION EDUCATION

The writer has often been asked, "How do you make tests to cover these kinds of activi-

ties?" The answer has usually been, "Why give tests?" It is generally admitted that many important things that might be learned in school cannot be tested with formal tests. The writer strongly feels, for example, that the great lessons learned in conservation education lie in the realm of the ethical, moral, and spiritual values, and would be difficult, if not impossible, to test with formal testing. Conservation education should have as its goal the building of positive attitudes and emotional feelings, as well as understanding how to use natural resources wisely, and to think charitably in these respects toward others now living and those who are yet to come in future generations.

However, to conform with traditional practice, perhaps tests should be given, but testing should be confined to the student's *understanding of great concepts*. For, after all, that is one of the aims—to bring experiences to the student in such a manner that he discovers the big ideas and has the over-all view of conservation and resource use.

In preparing a test there would be very few, if any, questions like this: "When did Theodore Roosevelt dedicate the Roosevelt Dam?" but many like this: "Many farmers in our area prefer a tin roof watershed because they believe which of the following to be true: . . . ."

Another immeasurable outcome in our program is the good public relations it builds up for biology and the school. Newspaper publicity revealed to the public that biology concerns itself with much more than bees, flowers, and embalmed squids. It is seen that biology considers important problems of society at large, and that biology does important and interesting things. The program "sells" biology and other sciences to the public, to the administration, and to the students.

CONCLUSIONS

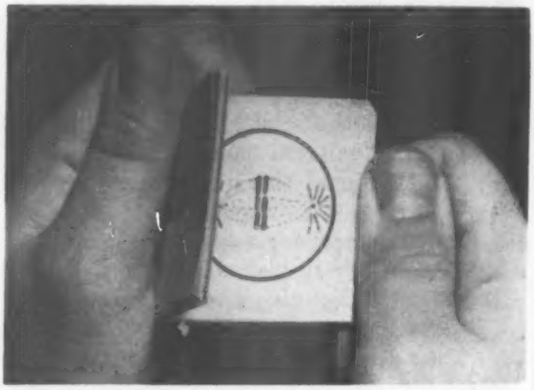
In a day when educators and the citizenry are examining our institutions for the inculcation of moral, ethical, and spiritual values, and when it is generally thought that science curricula have very little to offer in these respects, conservation education presents a hope and a way that is truly unique. On the one hand, conservation education offers one of the best opportunities in our educational system to teach these difficult values. On the other hand, conservation education concerns itself with great scientific principles. It is a functional way to teach science. It illustrates the point that science does have a natural place in all grade levels in which ethical, moral, and spiritual values may be inculcated.

Conservation is a "natural" for biology. Biology teachers must, can, and will show the way.

A "FLIP-CARD" TECHNIQUE

It is difficult to make a progressive action clear to a student by using a series of drawings or models of the principal stages involved. The relationships between stages, and the interstage conditions, are often vague. Much of this difficulty has been overcome by the use of moving-picture films but, unfortunately, they are often too expensive.

A good and economical way to illustrate such processes, with a minimum of preparation, is the "flip-card" method. Drawings are made of all the major stages of a process, as well as interstage gradations, at corresponding places on small cards. The size of the card may vary depending on the size of the drawings to be made, but a 2" x 3" size seems to fit most needs. When completed, the cards are all assembled in order and secured at one edge by stapling, sewing, or by any type of paper binder. When the bound edge of the card pack is held in one hand, and the loose edges "flipped" with the thumb of the other hand,



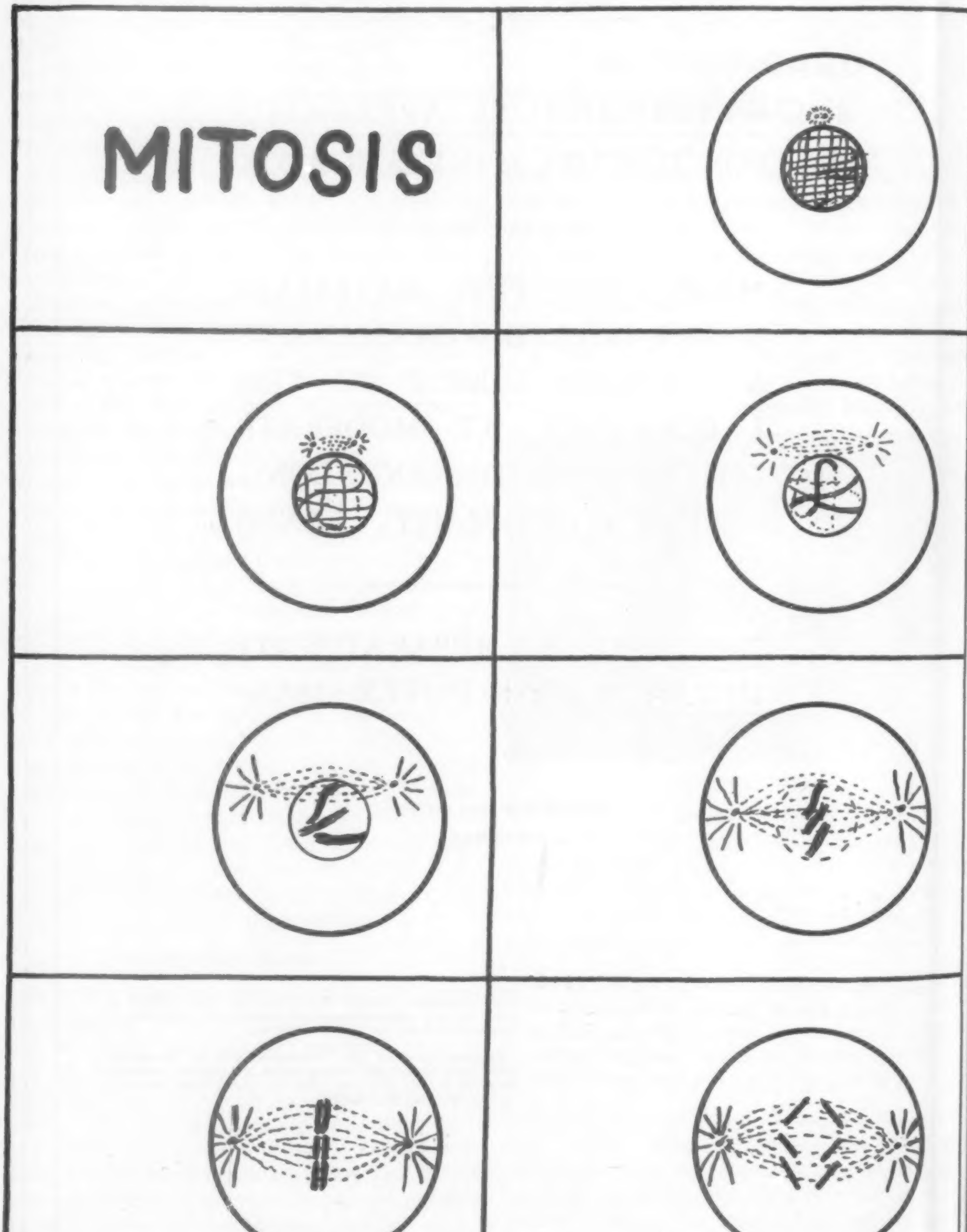
"Flip-cards" in use.

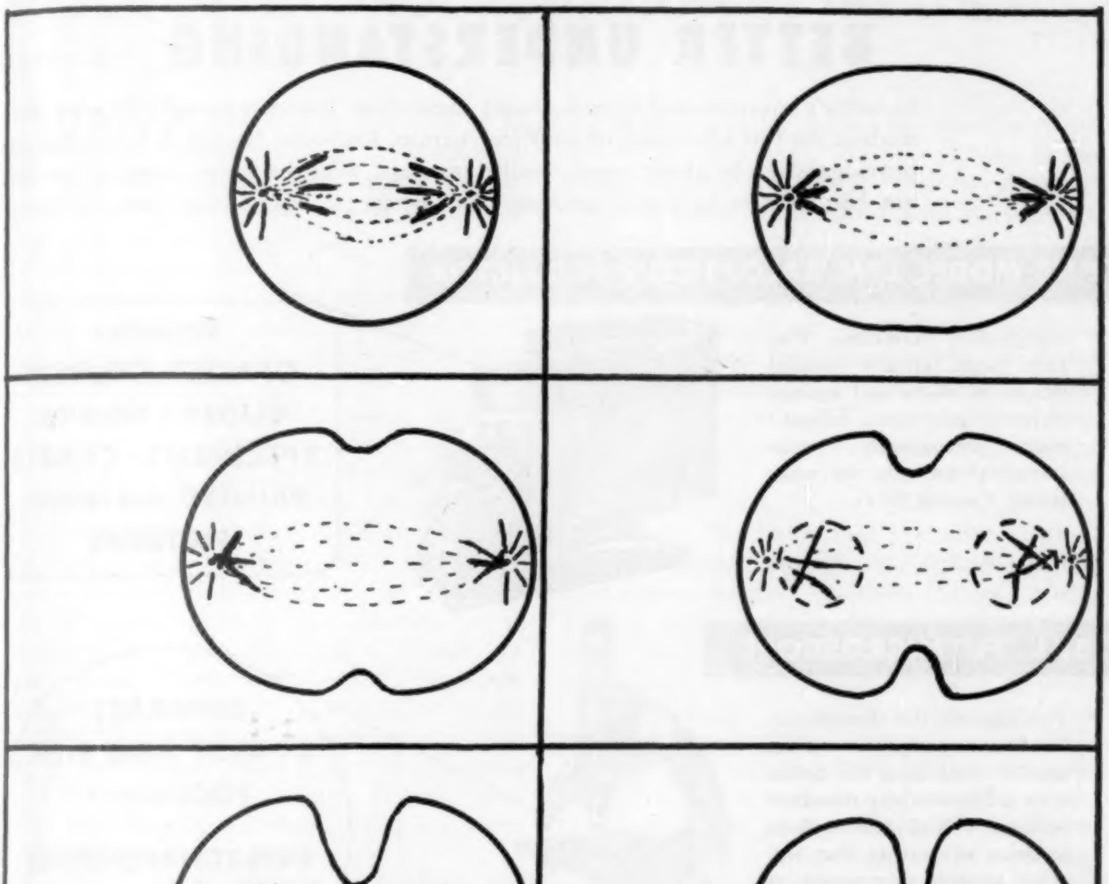
Editor's Note: Author Daniel's drawings of progressive stages in the process of mitosis may be cut out, pasted on 2" x 3" cards, stapled, and used to try out this interesting and novel teaching technique.

(*Continued on Page 40*)

the complete process unfolds to the observer in a matter of seconds. Any of the individual stages may be further studied in detail by merely turning to the card or cards representing that stage.

Drawings usable for the construction of a "flip-card" on animal mitosis are presented here. They teach the procedure faster and





much more effectively than any method I have used to date. Most of the biological, physical, and chemical processes lend themselves to this usage.

JOSEPH C. DANIEL, JR.,
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Adam's State College,
Alamosa, Colorado

STATUS OF ALCOHOL ADDICTION IN THE U S.A.[1]

RAYMOND G. McCARTHY, Research Associate, Yale Center of Alcohol Studies

The concept of uncontrolled drinking as an expression of character defect, an hereditary taint, or perhaps physiological habituation resulting directly from the effects of alcohol upon the human system is slowly being changed in the popular mind. During the last ten years, recognition of alcoholism as a health problem and a public health responsibility has been expressed through legislative action in 45 states.

All of the New England states and the states bordering the Atlantic seaboard, with the exception of one, have established tax-supported treatment facilities based on the assumption that alcoholism is a form of illness and that many alcoholics will respond to treatment when it is available. In addition, state-supported services are functioning in Louisiana, Michigan, Minnesota, Mississippi, New Mexico, North Dakota and Wisconsin. Legislation has recently been passed which provides for comprehensive programs in Indiana, Pennsyivania, and Texas. Metropolitan areas such as Buffalo, Chicago, Detroit, New York, Philadelphia, Pittsburgh, and Rochester have established services.

Alcoholism is a complex individual and social disorder which cuts across many specialized fields. It presents problems for the physician, the psychiatrist, the penologist, and the clergyman. Specialists in different fields of the past often viewed the problem from one particular angle. In the clinical approach to alcoholism, professional skills of an interdisciplinary team are brought to bear upon the individual case. The clinical team is concerned with the patient's physical condition, the significance to him of the use of alcohol, the assets and limitations within the personality which will influence his recovery, and the relationship this man has to self, his family, his job, and the social groups in which he functions. Recovery from alcoholism is not alone a problem of will power or of logical thinking. It is essentially a problem of emotional redistribution, which requires the development of some shift of emotional forces within the personality so that life without alcohol can become tolerable.

[1] Abstract of a talk by Mr. McCarthy before the afternoon session of NABT's Annual Convention in Boston, Dec. 28, 1953.

The alcoholic population represents a cross-section of American society. There is no single treatment approach, and no blueprint that will apply to the entire population group. Recovery is a long-term process, but the constructive effects are cumulative. An individual learns to derive satisfactions from sobriety once insight into the causes of his emotional discomfort has been acquired. Millions of people use alcohol but a relatively small number, perhaps 6–7%, become alcoholics. Why do some drinkers respond in this fashion while the great majority do not? Is there some physiological factor which has not been identified? We know that the rates of alcoholism are lower among some cultural groups than among others. Are there factors in family life, and in relationships to basic institutions, which make for a stability which is impervious to the chemical action of alcohol?

Many of the questions which are being raised require intensive research. The clinic provides a laboratory setting for research from which will be derived some of the data necessary for solution of the problem. More services are needed and we must recruit more personnel. Perhaps a greater need is recognition by the public at large of the concept of alcoholism as an illness so that, when the first symptoms appear, acceptance of treatment will be looked upon as evidence of good judgment. This means eliminating to all possible extent the traditional stigma which for centuries has been associated with the uncontrolled drinker and his behavior.

PROGRAM OF THE DETROIT BIOLOGY CLUB

The Detroit Biology Club, organized for over 50 years among teachers of metropolitan Detroit, offers the following series of monthly meetings:

Fall field trip to Kensington Park.

Tour of the Detroit Receiving Hospital.

Afternoon visitation of the Human Heredity Clinic, Institute of Human Biology, Univ. of Michigan, Ann Arbor.

A discussion of grading and inspecting foods by a member of the Marketing Division, U. S. Dept. of Agriculture.

Nature slides.

Trip to the Larro Feed Farm.

Week-end trip to Conservation Headquarters, Higgins Lake.

The officers of the organization are Helen Monroe, Northern High School (Pres.); Joyce Maples, Jeffers Intermediate School (Vice Pres.); Beth Halfert, Northern High School (Sec'y); John Woolever, Mumford High School (Treas.); all of Detroit.

PINE CONE BIRD FEEDERS

MARGUERITE McMEEKIN ZEHNER

Birds that winter in temperate climates do not need an involved or unusual diet. This easily-determined fact helps make the pleasant job of feeding winter bird friends a relatively simple task.

Nature stores up "meat" for the birds in the form of insect life beneath the shaggy bark layers of trees and shrubs, and in the form of cocoons and egg sacs or clusters on limbs and twigs. For the birds that eat from the ground, the same type of food may be found beneath fallen leaves and in rotting logs. Ripe seeds are found on trees, shrubs, and weeds, as well as under fallen leaves and grass. The heavy snows of winter bend some weeds and grass to the ground, and creeping birds may eat what otherwise would be swaying overhead and out of reach.

> **Ass't Editor Gabrielle's Note: The author is an outstanding teacher in the elementary grades at Berkley Hills School, Pittsburgh 9, Pa., with a fine philosophy of correlation of school subjects. Mrs. Zehner says, "My 4th grade class will always remember the mountain geography of California because this was studied too as pupils made bird feeders from pine cones I gathered in the San Bernardino Mts. The cones were also used as "bait" for an arithmetic lesson based on the transportation cost of the cones. Worms, frogs, and insects make more interesting visual education "props" than two apples, when teaching arithmetic. Multisyllable words are difficult, but children have no difficulty memorizing even the scientific names of birds they have "met personally."**

Thus a natural seed and "meat" diet keeps the winter songsters alive, fat, and chirping. Even in the coldest weather, birds seldom starve except when, for an extended period, everything outdoors is covered with deep snow or with ice. Even then nuthatches, small woodpeckers, titmice and some other birds can feed along the undersides of horizontal limbs just as comfortably and efficiently as on top. With ice on top surfaces of limbs, it is interesting to see these bird acrobats gathering bugs, worms, and seeds from beneath bark scales on the lower sides of tree limbs.

After such basic observations, it is relatively easy to design an all-weather and all-bird feeder. I have found that even in an urban community, once feed is provided consistently, the bird population in an ordinary dooryard increases rapidly. The seed reservoir should be of large capacity, preferably one to several quarts. It should be protected, but not closely enclosed, and a substantial perch should be provided. If the feeder is suspended by a wire, unwelcome visits by sparrows, starlings, and squirrels will be cut down.

The basic seed for practically all winter birds from the tiny chickadee to the large blue jay and cardinal is sunflower, preferably the large California varieties. Birds waste much of the so-called "wild bird mixtures," but practically all of them eat large sunflower seeds. A winter "meat" diet is easily supplied in the form of ground suet, available at small cost at almost any meat counter. Large pine cones are excellent dispensers for this suet.

Making pine cone bird feeders is a simple job. Gather large cones found under many types of pine trees, or purchase them from florists who stock them for use in decorative effects. A 6″ cone will hold a pound or more of ground suet. Before the suet is worked into the interstices of the cone, a pliable wire about 18″ long should be tightly affixed to the tip end of the cone. This is used to suspend it from the limb of a tree or a protruding arm or roof section of a feeder containing seeds. The coarsely ground suet can be pressed into the cone most easily when the suet is slightly warmer than room temperature. This temperature can be reached by kneading it with the hands until it becomes a plastic mass. Actually, melting the suet makes the job a messy one. Use of the suet-filled cone with a feeder containing loose sunflower seeds gives all of the birds a choice of food. It is interesting to watch a bird peck loose a few flecks

of suet from a cone, and then fly away with a fat sunflower seed as dessert.

That most birds prefer a diet of both seeds and suet is proven by the fact that, when suet cones are hung beside a tray of seed, the bird will quickly start eating from both. A pine cone is a practical suet dispenser because, hanging free from a limb or feeder roof, it always seems to have a surface available for feeding. Snow and ice may cake on top or on one side, but the side away from the wind is usually clear, and the bottom usually has suet crumbs unaffected by the weather. The pine cone "petals" are natural perches. A woodpecker looks like part of a cone when he grasps a "petal" with his claws and braces himself with his spiked tail between two "petals."

Here a nuthatch patronizes a pine cone bird feeder. The cones have been covered with coarsely-ground suet, and then rolled in sunflower seeds. This St. Francis bird feeder has a large compartment for loose seeds, and two such suspended cones. The combination provides feed, available in any kind of weather, for almost every type of winter bird.

The birds which will patronize a feeder containing loose sunflower seeds with accompanying hanging pine cones include cardinals, chickadees, nuthatches, both downy and hairy woodpeckers, and the flocks of juncos which usually browse on the ground beneath and eat what other birds knock loose or scratch out of the feeder. Cardinals, naturally a bit wary of swinging feeders, also prefer to pick up what drops to the ground. One of the problems sometimes faced with pine cone feeders is protecting them from flocks of marauding starlings. This can be done by stringing a perforated tin disc or can lid on the supporting wire above the cone. The tin disc, with a hole in the middle, is allowed to slide down the wire and rest loosely on top of the cone. Starlings will alight on the swaying tin disc, usually get a half-turn merry-go-round ride, and then fly away. The smaller, more agile birds simply cling to the side or bottom of the cone. An unprotected cone will sometimes be denuded in a day by starlings but, with a tin disc baffle, the starlings are unable to get near it.

Pine cone feeders are patronized most heavily when the temperature drops to near zero. This apparently is because the bird needs "fuel-type" food to generate body heat and, even at low temperatures, suet remains available and easy to peck loose.

Just a final word. Always suspend the suet cone at least six feet above the ground. Dogs like suet, too!

Across The Editor's Desk

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Week-end trip to Conservation Headquarters, Higgins Lake.

The officers of the organization are Helen Monroe, Northern High School (Pres.); Joyce Maples, Jeffers Intermediate School (Vice Pres.); Beth Halfert, Northern High School (Sec'y); John Woolever, Mumford High School (Treas.); all of Detroit.

PINE CONE BIRD FEEDERS

MARGUERITE McMEEKIN ZEHNER

Birds that winter in temperate climates do not need an involved or unusual diet. This easily-determined fact helps make the pleasant job of feeding winter bird friends a relatively simple task.

Nature stores up "meat" for the birds in the form of insect life beneath the shaggy bark layers of trees and shrubs, and in the form of cocoons and egg sacs or clusters on limbs and twigs. For the birds that eat from the ground, the same type of food may be found beneath fallen leaves and in rotting logs. Ripe seeds are found on trees, shrubs, and weeds, as well as under fallen leaves and grass. The heavy snows of winter bend some weeds and grass to the ground, and creeping birds may eat what otherwise would be swaying overhead and out of reach.

Ass't Editor Gabrielle's Note: The author is an outstanding teacher in the elementary grades at Berkley Hills School, Pittsburgh 9, Pa., with a fine philosophy of correlation of school subjects. Mrs. Zehner says, "My 4th grade class will always remember the mountain geography of California because this was studied too as pupils made bird feeders from pine cones I gathered in the San Bernardino Mts. The cones were also used as "bait" for an arithmetic lesson based on the transportation cost of the cones. Worms, frogs, and insects make more interesting visual education "props" than two apples, when teaching arithmetic. Multisyllable words are difficult, but children have no difficulty memorizing even the scientific names of birds they have "met personally."

Thus a natural seed and "meat" diet keeps the winter songsters alive, fat, and chirping. Even in the coldest weather, birds seldom starve except when, for an extended period, everything outdoors is covered with deep snow or with ice. Even then nuthatches, small woodpeckers, titmice and some other birds can feed along the undersides of horizontal limbs just as comfortably and efficiently as on top. With ice on top surfaces of limbs, it is interesting to see these bird acrobats gathering bugs, worms, and seeds from beneath bark scales on the lower sides of tree limbs.

After such basic observations, it is relatively easy to design an all-weather and all-bird feeder. I have found that even in an urban community, once feed is provided consistently, the bird population in an ordinary dooryard increases rapidly. The seed reservoir should be of large capacity, preferably one to several quarts. It should be protected, but not closely enclosed, and a substantial perch should be provided. If the feeder is suspended by a wire, unwelcome visits by sparrows, starlings, and squirrels will be cut down.

The basic seed for practically all winter birds from the tiny chickadee to the large blue jay and cardinal is sunflower, preferably the large California varieties. Birds waste much of the so-called "wild bird mixtures," but practically all of them eat large sunflower seeds. A winter "meat" diet is easily supplied in the form of ground suet, available at small cost at almost any meat counter. Large pine cones are excellent dispensers for this suet.

Making pine cone bird feeders is a simple job. Gather large cones found under many types of pine trees, or purchase them from florists who stock them for use in decorative effects. A 6″ cone will hold a pound or more of ground suet. Before the suet is worked into the interstices of the cone, a pliable wire about 18″ long should be tightly affixed to the tip end of the cone. This is used to suspend it from the limb of a tree or a protruding arm or roof section of a feeder containing seeds. The coarsely ground suet can be pressed into the cone most easily when the suet is slightly warmer than room temperature. This temperature can be reached by kneading it with the hands until it becomes a plastic mass. Actually, melting the suet makes the job a messy one. Use of the suet-filled cone with a feeder containing loose sunflower seeds gives all of the birds a choice of food. It is interesting to watch a bird peck loose a few flecks

of suet from a cone, and then fly away with a fat sunflower seed as dessert.

That most birds prefer a diet of both seeds and suet is proven by the fact that, when suet cones are hung beside a tray of seed, the bird will quickly start eating from both. A pine cone is a practical suet dispenser because, hanging free from a limb or feeder roof, it always seems to have a surface available for feeding. Snow and ice may cake on top or on one side, but the side away from the wind is usually clear, and the bottom usually has suet crumbs unaffected by the weather. The pine cone "petals" are natural perches. A woodpecker looks like part of a cone when he grasps a "petal" with his claws and braces himself with his spiked tail between two "petals."

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If you wish copies for yourself and your pupils, write to: Public Relations Division, General Electric Co., Schenectady, N. Y. At the same time, why not request copies for colleagues in your English Department?

Attractive, practical, authoritative and **free booklets on various professional careers,** including teaching, medicine, law, aeronautical engineering, etc., are available in quantity by addressing a postal card to: Public Relations Dept., New York Life Insurance Co., 51 Madison Ave., New York 10, N. Y. Your Editor recommends these highly for pupil guidance toward careers in the life sciences and other professional and vocational areas.

Did you know that an average ant, in good condition, can travel about 720 feet an hour; a "snail's pace" is about one mile in 14 hours; a good lusty sneeze can register an air velocity of approximately 100 miles an hour; an elephant can open a pop bottle with his big toenail; that ice-cream-loving youngsters can get as much as 300 licks from a single ice cream cone; that chickens can swim?

The electron microscope has revealed, for the first time, the size and shape of the virus particles which cause polio. Each virus particle is spherical in shape, and measures about one-millionth of an inch in diameter.

Ass't Editor Charles C. Herbst has been named Pres. of The California Teachers Ass'n. Congratulations, Charles!

Elementary teachers will be interested in the clever and **amusingly illustrated free booklets** on elementary life science available from Agricultural Research Dept., Swift and Co., Chicago 9, Ill. Especially recommended for your classes are: *The Story of Soil; The Story of Plants; The Story of Grass.* **Animated color films,** with supplementary booklets, are also available by paying only transportation charges.

LETTERS

Dear Editor:

If I had any doubts about the circulation, or if I ever questioned the devotion of America's biology teachers, I would be convinced by the flood of requests which are arriving daily because of your kindly notice of our pamphlets on *The Home Museum.*

Very earnestly,
C. M. Goethe

Dear Editor Vance:

Chief, I liked everything in the fall issues from *Seashore Inshore* and *Enzymatic Aid for Euglena,* to the "fears of Woolever" and *Across the Editor's Desk.* Carry on—we are with you!

Respectfully,
Marcellus C. Miller

A New Biological Frontier: Your Favorite Lake

CALVIN FREMLING, Ecological Research, University of Utah

Were we being followed? A quick glance over my shoulder assured me that we were. We were greatly outnumbered, and knew from past experience that our followers were hungry. The thought of food was obviously foremost in their tiny brains. They seemed to know that we would provide them with their dinner. We made no effort to elude them as we leisurely swam toward the sandy bottom, for these timid creatures in our wake were old friends of ours.

I watched as my companion glided downward to an algae-covered rock. Carefully he dislodged it. A small crayfish darted out, only to be pounced upon by a horde of flashing silver forms. Our friends, the rock bass, had lost all fear now. Impatiently they waited as Chuck rolled over the large rocks on the bottom of the river in that languid, effortless fashion of men who invade the world of water. The ravenous throng seemed disappointed as the interloper snatched first one and then another of the larger crayfish and placed them in the flimsy sack which flowed from his belt. Looking up, Chuck smiled as he watched the goggled-eyed fish hovering around him with their disappointed, mildly reproving expressions over having lost another large crayfish. Suddenly he laughed! Even when only ten feet below the surface laughing is a near calamity. Up he went! He was still gurgling and spitting water when I surfaced. Lifting our face masks we swam lazily to a sun-baked sand bar for a rest, and the unfinished portion of his laugh.

The collection of biological materials for the class room usually entails a considerable amount of work, but we hesitated to consider our afternoon's activity as "work." Spending an afternoon in the fishes' "back yard" is an education in itself, but this underwater venture was also profitable in terms of the materials that we had collected. Our two hours of sport had yielded enough clams, crayfish, turtles, leeches, snails and other materials for an entire school year of laboratory study and dissection. But by far the most pleasant aspect of our adventure was the element of exploration. To the observer with a face mask every familiar lake, pond, and river becomes a new and unexplored world.

Much has been written recently about shallow water diving (sometimes called "skin diving" or "free diving"). Many coastal colleges and universities have integrated this sport into their biology program as a supplement to conventional laboratory work. Relatively little attention, however, appears to have been directed toward *freshwater* free diving. The vast majority of our schools (both high schools and colleges) are inland. Most of these schools have adequate bodies of water near at hand, ready to open entirely new vistas for the curious and progressive biology teacher and his students. Yet, virtually none of our inland high schools have made any serious effort to include this type of field experience into their biology work.

Contrary to one's initial supposition, practically no equipment is necessary for such a field trip. Only the face mask is actually mandatory. These masks enclose the eyes and nose, and should be used instead of goggles. Goggles offer much less protection to the diver and are much less durable. Swim fins are a great aid in underwater work; they increase the swimmer's speed, and permit him to swim easily without having to use his hands. This "emancipation" of the hands tremendously increases the amount of work which can be accomplished in any given dive. The swim fins, however, are not necessary for field trips such as are considered here. A mesh or net sack (such as potato or onion sacks), with a band of elastic woven through its open end and attached to the belt of the swimmer, serves most admirably as a collecting bag.

The inability to swim will curtail the activities of many students, but such field trips greatly increase their desire and their opportunities to learn how to swim. Non-swimmers can participate in the activities too. With a properly fitted face mask, the non-swimming student may wade into the water only waist deep and, by placing his face in the water, observe this new medium and collect many

valuable biological materials. The greatest fear of the beginning swimmer is that of getting water into his eyes, nose, and lungs. The face mask helps to alleviate these fears. Water scopes (water-tight containers with open tops and glass bottoms) are easily constructed and permit an observer to watch this fascinating underwater world from a boat or dock. Students not engaged in swimming or shore-line collecting can be occupied with caring for specimens which are brought to the surface. Most of these materials must be placed in containers of water or preserved immediately.

During the winter months it is impossible to engage in this type of collecting in most sections of the country, but the early fall and late spring days are well suited for such activities. This type of field trip is an ideal motivating activity for prospective biology students. Inviting next-year's "undecided" students to accompany such a late spring field trip aids materially in assisting them to make their decision the following autumn. Subsequent biology laboratory exercises are doubly interesting and instructive to the students because they work with materials which they collected or preserved for themselves, and which still are marked with the tags bearing their names.

Biology is defined as the study of *living* things. Our inland waters abound with life, and they lie waiting to be explored. Here is a living laboratory that teaches biological principles in a vitally new and dramatically effective way. Here is a challenge to the progressive biology teacher. Here is a new biological frontier in your favorite lake.

NATIONAL CONVENTION NEWS

Election results revealed the following as your national officers for 1954: Arthur J. Baker, Pres.; Bro. H. Charles, Pres.-Elect; John Breukelman, 1st Vice-Pres.; Dorothy Matala, 2nd Vice-Pres.; John Harrold, Sec'y-Treas.

Unexpected developments at the Boston meetings force your Editor to announce, with sincere and heartfelt professional and personal regrets, that his direct responsibilities as interim-editor terminate with this issue. Assoc. Editor Paul Klinge, 246 Ohmer Ave., Indianapolis 19, Ind., will assume responsibility for the March, April, and May issues. Editorial correspondence regarding these issues should be addressed to Mr. Klinge. A new Editor may be announced in May. It is your Editor's sincere and fervent hope that the forward-looking changes made in our Journal since October will further culminate in making ABT the top-ranking publication in its field.

Books For Busy Biologists

Hovanitz, William. *Textbook of Genetics.* Elsevier Press, Inc., Houston. x + 419 pp. illus. $5.95.

This is a technical text which makes extensive use of statistical method to explain genetic data and theory. One of the stated purposes of the author, Prof. of Cytology and Genetics at the Univ. of San Francisco, is to introduce the student to genetic nomenclature and symbolism by using it consistently and thoroughly throughout the book; this is done. It is replete with varying opinions of authorities on genetic fine points. Human genetics is not emphasized, but cytology is. Teachers will find this an excellent source of genetic problems and up-to-date genetic information.

Paul Klinge, *Associate Editor*

Rotter, George E., Weresh, Andrew A., and Goldenstein, Erwin. *Fountains of Freedom.* Pacific Press, Mountain View, Calif. 1953. $3.50.

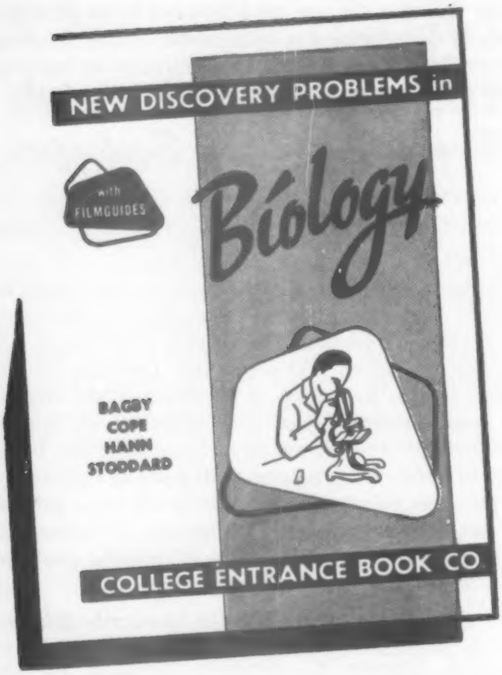
This textbook is specifically designed to help 9th and 10th graders to develop traits of thrift, honesty, courtesy, fair dealing, respect for parents, loyalty, charity, love for the land, and an appreciation for the gifts of nature. I rate it as excellent for school use, but also as a first choice for every home with adolescent children. The Soil Conservation section should impress young people with the need for soil conservation and their responsibility as custodians of the land. Other natural resources are considered. A concise Teachers' Manual is provided. The authors are members of the Nebraska Dept. of Public Instruction, and have been in public school work for many years. Mr. Rotter is Supervisor of Conservation Education.

Adrian C. Fox
U. S. Soil Conservation Service,
Lincoln, Nebraska

Hardin, Garrett. *Biology: Its Human Implications, Rev. Ed.* W. H. Freeman and Co., San Francisco, Calif. xii + 720 pp. illus. 1952.

The broad coverage of biological principles and information in this excellent textbook offers students a complete course in college general biology. Sections of the original edition on heredity, evolution, and microorganisms have been expanded in this revised edition. Chapters are divided into sections to facilitate choosing portions of the text to fit into varying lecture outlines. The specific discussion of scientific method in Chapters 1 and 17

(*Continued on Page 51*)



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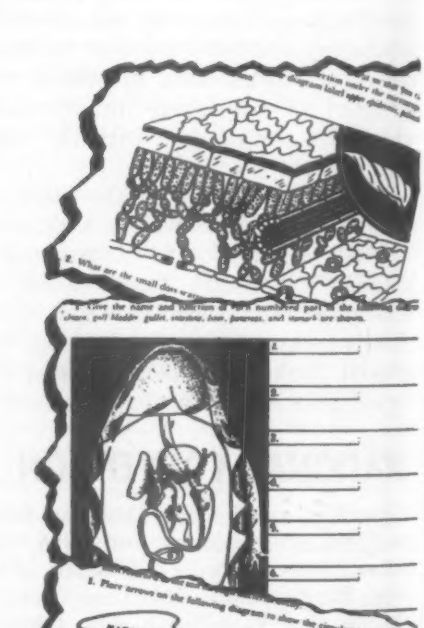

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(Continued from Page 49)

is especially good. The history of biology is effectively interwoven into the text matter. The book is weak on photographic illustrations, but contains many diagrams which have distinct teaching values. Chapters close with outline reviews, questions, problems, and suggested readings. The bibliography and index are complete and comprehensive.

THE EDITOR